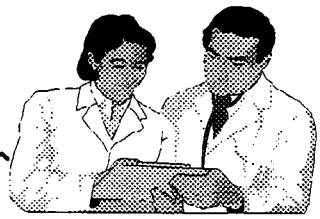
LabLink



Laboratory Information from the Michigan Department of Community Health

Vol. 2, No. 2 January 1997

International Training Partnerships Developed at Michigan Department of Community Health

Frances Pouch Downes, Dr. P.H.

Dr. Samuel Aryeetey, Program Director of Laboratory Technician Training School at University of Ghana and Deputy Director of the Health Laboratory Services, in Accra, Ghana West Africa visited the Michigan Department of Community Health Laboratory for a four week training course in September. The Michigan laboratory was chosen to host the international visitor by the Association of State and Territorial Public Health Laboratory Directors (ASTPHLD). The USAID-funded training program was arranged through the Partners for International Education and Training of Washington, DC.

The Ghanaian laboratory technician training program is a three year post-secondary school program that enrolls approximately 40 students per year. Graduates of the this program may apply to the two-year medical technologist training program. Virtually all medical laboratory testing personnel in Ghana are graduates of these programs.

The Health Laboratory Services provides testing services for Korle-Bu Hospital, a 2000 bed government-sponsored hospital in the nations capital. The lab is also a national reference testing center for public and private laboratories.

Based on his responsibilities and interests, an individualized training program was designed for Dr. Aryeetey. Laboratory personnel provided technical, managerial and quality assurance training. One of the highlights for Dr. Aryeetey was laboratory equipment maintenance and repair.

I will use the quality assurance training I received in Michigan to develop a nationwide program to improve quality assurance programs in medical laboratories and train students to value these principals in their professional lives, said Dr. Aryeetey.

Additionally, Dr. Doug Estry, Michigan State University Medical Technology Department, partnered with MDCH to provide training in clinical laboratory course development and student assessment. Dr. Aryeetey visited clinical internship sites for medical technologists at St. Lawrence Hospital in Lansing and William Beaumont Hospital in Royal Oak. An introduction to the laboratory accreditation process was provided. Dr. Aryeetey visited Kent and Ottawa County Health Departments to experience to scope of testing performed at other public health agencies.

"The MDCH laboratory participated in this international training opportunity because of our commitment to work with ASTPHLD to provide international leadership in promoting quality laboratory testing worldwide. Also, training laboratory professionals from tropical areas is essential for a global response to emerging infectious diseases," said Dr. Robert Martin, Laboratory Director.

The Michigan Department of Community Health Laboratory was selected as the Sister Laboratory to the National Public Health Laboratory in Jamaica. The ASTPHLD and the Pan American Health Association (PAHO) paired the Michigan and the Jamaica in a one-year pilot program to strengthen international public health laboratory understanding, teamwork and capacity. The Michigan laboratory was one of two ASTPHLD member labs chosen for this program.

The Jamaica laboratory has identified quality assurance program development, technical training and medical laboratory accreditation as priorities. Although the private laboratory sector is growing in throughout the country, there is no government oversight of medical laboratories and quality assurance programs are not uniformly practiced.

Throughout the upcoming year, the MDCH Lab will supply technical, managerial and safety training to laboratory personnel from Jamaica. Communication links are being established to promote frequent communications between staff in the two labs. MDCH will serve as a resource for sample documents for review and adaptation, references and experience. MDCH will also encourage development of strong links between the lab and epidemiology programs.

As a initial step in the twinning process, Dr. Robert Martin and Dr. Frances Pouch Downes visited Kingston, Jamaica to work with public health laboratory leaders in identifying training priorities and develop communication strategies between the two labs. Members of the PAHO Committee of Laboratory Standards and the Caribbean Epidemiology Center were also included in the assessment visit. In addition to visiting public health laboratories, the team visited private and university labs and epidemiologists.

Disease Reporting: Its the Law

Frances Pouch Downes, Dr. P.H.

Laboratories in Michigan play an important role in infectious disease control. The Michigan Communicable Disease Rules require that the laboratory which receives a specimen yielding *Mycobacterium tuberculosis* is responsible for the submission of the first isolate to the MDCH laboratory. Additionally, any isolate of *M. tuberculosis* from a patient collected 90 days after the initial specimen must also be forwarded to MDCH. Epidemiological testing of these isolates is an critical component in identifying outbreaks and disease transmission patterns, enabling rapid treatment and prophylaxis, and targeting prevention programs. If your lab is performing mycobacteriology cultures, do you have a mechanism in place to assure that all required isolates are submitted? If you refer your mycobacteriology specimens, does your reference laboratory routinely send MDCH the required isolates? Call Dr. Barbara Robinson-Dunn at (517) 335-9641 if you have questions.

In addition to *M. tuberculosis*, the MDCH laboratory requests that all initial isolates of *Salmonella, Shigella* and *Escherichia coli* O157 be submitted. Isolates from specimens procured 90 days or more after the initial isolate will also be accepted. Influenza isolates from the beginning and end of respiratory disease season are requested to monitor the vaccine component adequacy.

The Michigan Communicable Disease Rules require that laboratory directors submit reports of 38 infectious diseases and notify local or state public health agencies of unusual occurrence, outbreak or epidemic of any infection to the local health department in the patients county of residence (see LabLink Vol. 1, No.4).

The Disease Control Rules help protect Michigan's health. Laboratorians statewide are critical in this essential activity. Are you doing your part?

CLIA UPDATE

Clinical Laboratory Improvement Advisory Committee approved eight additional tests or testing systems to the waived category. The newly designated waived tests include the:

Hemocue B-glucose system for glucose
Quidel QuickVue In-line One-Step Strep A Test for group A streptococcus (throat only)
ChemTrak AccuMeter for cholesterol
*Cholestech L*D*X Test System for cholesterol, triglyceride, HDL cholesterol, and glucose*
Serum Pyloritek Test Kit for Helicobacter pylori
Boerhinger Mannheim Accu-Chek instant Plus Cholesterol System
Johnson & Johnson ADVANCED CARE Cholesterol Test
All qualitative color comparisons for pH testing of body fluids other than blood

Two additional agencies have been recognized as certifying boards for laboratory director and clinical consultant of highly complex laboratories. In addition to American Board of Clinical Chemistry, American Board of Bioanalysis, American Board of Medical Microbiology and the American Board of Medical Laboratory Immunology, The Department of Health and Human Services has now approved the American Board of Medical Genetics to qualify laboratory directors. Under CLIA personnel regulation, individuals with a doctoral degrees in a chemical, physical, biological or clinical laboratory science and certification by one of these boards, qualifies to act as laboratory director or clinical consultant of a highly complex laboratory.

The following is the most current summary from the collaborating study between the Michigan Department of Community Health Disease Surveillance Section, Microbiology Section, and 33 hospital based microbiology laboratories. The study is designed to monitor the prevalence of these particular agents in the State of Michigan.

Antimicrobial Resistance Trends, Regions One (Detroit Area) and Two to Twelve (Outstate Michigan)
Penicillin Resistant Study-site[1] Isolates of Streptococcus pneumoniae and Vancomycin Resistant Sterile-site[2] Isolates of Enterococcus spp.
Michigan Sentinel Hospital Laboratory Survey, Third Quarter, 1995 through Third Quarter, 1996

Percent Resistant[3]

		1995 Quarters		1996 Quarters					
		Third + Fourth		First		Second		Third	
Microorganism	Resistance Classification[3]	Reg 1	Reg 2-12	Reg 1	Reg 2-12	Reg 1	Reg 2-12	Reg 1	Reg 2-12
Str. pneumoniae	Moderate or High	20	14	20	19	23	20	34	20
Str. pneumoniae	High Level only	5	4	5	2	5	3	9	4
E. faecalis	Resistant	1	0	2	1	1	0	3	1
E. faecium	Resistant	33	7	37	13	48	9	35	5
Total Enterococcus	Resistant	7	1	9	3	10	2	9	3

[1] Study sites = blood, CSF, deep surgical wound, pleural fluid(fl), peritoneal fl, respiratory specimens or synovial fl.

[2] Sterile sites = blood, CSF, deep surgical wound, pleural fluid(fl), peritoneal fl, or synovial fl.

[3] NCCLS, Performance Standards for Antimicrobial Susceptibility Testing, Volume 14, Number 6.

Legionnaire's Outbreak Riddle Solved

Sandip Shah, MS, MT(ASCP)

Legionnaire's disease may be caused by any of the several dozen species and serotypes of *Legionella* bacteria; *Legionella pneumophila* serogroup 1 is the most common. Legionnaire's disease develops in a minority of people who inhale this organism when it is aerosolized from water sources. Several community outbreaks of Legionnaire's disease occur in North America every year. These community outbreaks are most commonly associated with cooling towers, although decorative fountains and other mist-producing sources are occasionally implicated. The factors that lead to the massive growth of *Legionella* bacteria in cooling towers, resulting in an outbreak, are largely unknown. Exposure periods lasting from several hours to several days are typical of community outbreaks of Legionnaire's disease. Most likely this is because the particular conditions permitting rapid growth of *Legionella* do not persist naturally for longer time periods.

In mid October, 1996, MDCH was contacted by Oakland County Health Division (OCHD) officials and Farmington area hospitals for assistance in investigation of a possible cluster of Legionnaire's disease cases in Farmington area. MDCH agreed to provide epidemiologic consultation and laboratory services to the OCHD in their investigation.

Infection control practitioners were asked to report patients with positive *Legionella* urine antigen tests or cultures who were from the Farmington/ Farmington Hills area and those from surrounding communities who had been in that area prior to onset of illness. On receipt of the reports, the OCHD verified the information provided concerning place of residence, illness history, and laboratory diagnostic work and reported this information to the MDCH.

MDCH contacted the patient and/or family members at the hospital and/or by phone. Information was collected concerning the patient's illness and medical history. The locations and route of travel between the patients home and work place, and all other places visited during the two weeks prior to onset of illness, were collected in as much detail as possible. No common indoor source was found. OCHD conducted all activities related to the identification and sampling of cooling towers and other potential sources of the outbreak. A Michigan State Police helicopter was obtained for an aerial search because cooling towers are most commonly located on rooftops. The aerial survey area identified 35 buildings with rooftop machinery resembling cooling towers, fountains, or other potential outdoor mist-producing sources for the outbreak. Eleven sites had potential sources that were operational during the exposure time interval. Samples were collected from all eleven sites and submitted to the MDCH laboratory for culture. If units had evidence of potential for bacterial growth, the operators were advised to immediately clean and sanitize them, as a precautionary measure.

An outbreak-associated case was defined as a person: 1) with urine antigen or culture confirmed Legionnaires disease; 2) with onset of illness in late September or in October; and 3) who lived, worked or visited in the likely exposure area.

Culture isolates from patients fitting the definition for a case were collected from the hospital laboratories. MDCH reconfirmed the identity of all patient isolates, provided all environmental specimen culturing services, speciated and typed all Legionella isolates, and performed DNA fingerprinting by pulsed field gel electrophoresis.

Thirty persons with illness fitting the definition for a case were identified; four of these 30 persons died. The median age was 70 years; one-half were male; one half were cigarette smokers. Illness onset dates ranged from September 30 to October 18, 1996. Seven patient isolates of *Legionella pneumophila* serogroup 1 were obtained from cases.

The matched case-control analysis determined that cases were more likely to have: 1) visited specific locations near or walked near the Grand River Avenue/Orchard Lake Road intersection; and 2) visited a local market. Neither exposure, nor visiting other locations/intersections in the area was found to be statistically associated with illness, when exposure in the Grand River Avenue/Orchard Lake Road area was taken into account.

Legionella pneumophila serogroup 1 with an identical DNA fingerprint pattern as the first five available case isolates was cultured in very high concentrations from each of the four pre cleaning samples from the cooling tower on the roof of the local market. One environmental swab from a nearby cooling tower was positive for the same strain of *Legionella pneumophila* serogroup 1; however, the water sample from the same cooling tower was negative. No other *Legionella pneumophila* serogroup 1 was identified in other water specimens from cooling towers, decorative fountains, or other mist-producing outdoor environmental site specimens. One sample collected after cleaning of the market s cooling tower demonstrated a very low concentration of *Legionella pneumophila* serogroup 1.

The combined evidence of the epidemiologic, environmental, and laboratory investigations indicates that this outbreak of Legionnaire's disease was related to airborne transmission from the cooling tower located on the roof of the Farmington market during the last few days of September and early October. The epidemiologic association of exposure at and/or near the market is strong and consistent. No other areas or locations were implicated statistically. Patient and cooling tower isolates had an identical DNA fingerprinting pattern, implying that they were from the same source.

The available evidence indicates that the outbreak of Legionnaire's disease that occurred among residents and visitors to the Farmington and Farmington Hills Area is over. Cleaning of the cooling tower reduced the concentration of Legionella to very low levels that are unlikely to pose an health risk.

INFLUENZA SURVEILLANCE FOR THE 1996-1997 SEASON

Each year in Michigan, hundreds of people die as a result of the complications of influenza. Public health authorities need the help and cooperation of Michigan physicians in their efforts to promptly determine the type, geographic distribution and amount of influenza that is occurring.

The Centers for Disease Control and Prevention has not yet predicted the influenza type that may predominate this season. As you are aware, in past years, illness due to influenza A has been more severe than that due to Type B. In the 1995-96 season, influenza A (H1N1) isolates were predominant both in Michigan and nationally, although all 3 strains circulated this past season. Influenza-like illness reports peaked shortly after the new year.

Michigan local health departments will be coordinating epidemiologic surveillance of influenza for their areas of jurisdiction. Prompt reporting of increases in influenza-like illness to local health authorities is important because prophylaxis and treatment decisions depend on it.

A limited number of specimen collection kits are available for use in suspect outbreak situations through local health departments. Testing of specimens for individual diagnostic purposes will not be available through the MDCH laboratory again this influenza season.

Your assistance in reporting increases in influenza-like illness to local and state health authorities is very much appreciated. They are interested in any information physicians may have on influenza-like illness in schools, nursing homes or their community.

Virus Strains Selected for the 1996-97 Influenza Vaccine:

A/Texas/36/91-like (H1N1), A/Wuhan/359/95-like (H3N2), and B/Beijing/184/93-like. The Influenza A (H3N2) component is new this season. Please note, for both A/Wuhan/359/95-like (H3N2) and B/Beijing/184/93-like antigens, U.S. manufacturers will use the antigenically equivalent strains A/Nanchang/933/95 (H3N2) and B/Harbin/07/94 because of their growth properties.

Ed. note: The virology laboratory at MDCH has isolated 14 cases influenza as of 12/19/96. All isolates are Type A (H3N2).

FOUR MILLIONTH BABY TESTED

Marilyn M. Boucher, MT (ASCP)
Division of Clinical Chemistries and Toxicology

The Newborn Screening Laboratory at the Michigan Department of Community Health recently observed a noteworthy event. The 4 Millionth Michigander was tested ! The State of Michigan introduced newborn screening in 1965 when technology to identify PKU-afflicted newborns first became available. With the passage of Public Act 14 in 1987, statewide infant screening was mandated. Testing was expanded to include Hypothyroidism (T4/TSH), Galactosemia, Biotinidase Deficiency, Maple Syrup Urine Disease, and Sickle Cell Anemia. An assay for Congenital Adrenal Hyperplasia came aboard in July of 1993. These disorders, if left unidentified and untreated , can result in crippling pain, profound mental and/or physical retardation, coma and death.

Between 135,000 -150,000 babies are born in the State of Michigan annually, and the laboratory tested it s **four millionth** baby on November 8, 1996. The Newborn Screening lab performs 5,000 assays per day on 700 newborns using High Performance Liquid Chromatography, Rapid-Flow Analysis, Radio- and Fluoro-Immunoassays, Bacterial Inhib Assays and other tests. Large volume testing can be long, repetitive and frustrating, but laboratory staff are encouraged to visualize the squalling bundle protesting his/her heelstick when they punch out those tiny blood spots! Congratulations to the lab on **four million** healthy Michigan newborns !!

E. coli Toxin Testing Now Available at Michigan Department of Community Health Laboratory

William A. Schneider,
Supervisor, Enterics/STD/Chromatography Unit

MDCH has offered serotyping for *Escherichia coli* O157:H7 for several years. Other serotypes produce Shiga-like toxins (SLT) 1 and 2 and have been implicated in human diseases. Due to the difficulty in locating serotyping reagents for SLT-producing *E. coli* and the current test volume, another method for identifying disease causing strains is needed.

January 1, 1997, the MDCH Bacteriology Laboratory will begin testing all *E. coli* cultures submitted for enteric serotyping for SLT1 and/or SLT2 production using a newly developed gene probe assay. This testing will be performed weekly. Strains that do not produce SLT1 or SLT2 will be reported Negative for SLT1 and SLT2. They will not be serotyped. Only strains producing SLT1 and/or SLT2 will be screened for O157:H7, O111 and O126 at MDCH. Other toxin producing strains will be sent to the Centers for Disease Control and Prevention to be serotyped.

We would like to acknowledge Ms. Laura Mosher, Molecular Epidemiology Section, for her work in developing this assay and assisting our efforts to offer this service.

We feel this will be a very useful test for diagnosis and surveillance of enteric disease caused by *E. coli*. If you have any questions regarding this testing, please call the MDCH Bacteriology Laboratory at (517) 335-8133.

HANTAVIRUS UPDATE

Patty Clark, MPH

As of November 19, 1996, 154 cases of Hantavirus Pulmonary Syndrome (HPS) have been identified in 25 states. The distribution of HPS cases includes areas of western, eastern, southeastern, and southern United States, including regions bordering Mexico and Canada. Most U.S. cases have been caused by infection with *Sin Nombre virus* (SNV). The primary rodent reservoir for SNV is the deer mouse *(P. maniculatus)* whose range includes the continental United States except the eastern seaboard and the Southeast. Cases of HPS have also been documented in Canada, Brazil, Paraguay, and Argentina.[1]

Case fatality rates continue to be high. The overall case fatality rate is 50.7%. Annual case fatality rates for 1993 through 1995 were 56.0%, 38.7%, and 40.9% respectively.[1] HPS is characterized by fever, headache, and cough, followed by rapid development of respiratory failure. Human infection occurs when infective saliva or excreta are inhales as aerosols. Most cases of human illness have resulted from exposure to naturally infected wild rodents in a rural environment.

The Michigan Department of Community Health has been performing Hantavirus IgG and IgM testing since June of 1996. Samples have been tested using the CDC Enzyme Linked Immunoassay for IgG and the CDC IgM Capture ELISA. Six individuals have been tested for both IgG and IgM antibodies. Two of these individuals have had acute and convalescent samples tested, the rest were single sera. All specimens tested negative for Hantavirus IgG and IgM antibodies.

Specimens are accepted from patients who exhibit disease consistent with the current case definition of HPS. Potential cases must have one of the following:

> febrile illness (temperature of at least 101°F) occurring in a previously healthy individual, characterized by unexplained adult respiratory distress syndrome or bilateral interstitial pulmonary infiltrates developing within one week of hospitalization with respiratory compromise requiring supplemental oxygen, OR unexplained respiratory illness resulting in death in conjunction with an autopsy examination demonstrating noncardiogenic pulmonary edema without identifiable specific cause of death.

The acute sample should be drawn near admission. A second sample should be drawn as late as possible, but no later than 21 days after the acute. A sample volume of 2.5 ml of serum is the preferred amount. It will be necessary to submit a further sample for confirmation testing if antibodies are detected initially

Whatever happened to Staphylococcal Phage typing?

Nancy J. Stoneman, Microbiologist - MDCH Upper Peninsula Division

Staphylococcus aureus continues to be a significant cause of both nosocomial and community acquired infections. There are many different methods of testing the relatedness of organisms.One traditional method for Staphylococcus aureus isolates is the use of bacteriophage typing. These bacteriophage (phage) are viruses that take over the nucleic acid synthesis of a host cell eventually killing it. This phenomenon is the basis of phage strain typing. Although a good method, it does have its limitations. The bacteriophage type may change over time as a result of changes in growth conditions, exposure to UV light, or the introduction of plasmids. The results are dependent on the number and types of phage used; consequently, some strains may be nontypable. A better method of typing would respond to changes within a strain or to the emergence of new strains so that all the isolates tested could be categorized.

At the MDCH laboratory, Bacteriophage typing has been replaced with a newer molecular method - analysis of chromosomal DNA restriction patterns by pulsed field gel electrophoresis (PFGE). PFGE involves embedding genomic DNA in agarose, lysing the cells within the agarose, fragmenting the DNA with enzymes, and resolving the resulting fragments by electrophoresis. The result is a gel that contains bands of DNA fragments arranged according to molecular weight.The distinct number and location of the bands create a pattern called a DNA fingerprint. The pattern produced by an organism will depend on the enzyme used, and the conditions under which the gel was run.

PFGE is a very discriminating, sensitive and a reproducible method of molecular strain typing. When changes occur in an organism s DNA the banding pattern may change; some bands may disappear and new bands may appear. Comparing the location and the number of bands will indicate whether the isolates are the same strain, genetically related, or are different strains. Strains of many bacteria can be differentiated by PFGE, unless a particular organism shows very little genetic diversity. Each isolate of Staphylococcus aureus will produce a DNA fingerprint; isolates will no longer be classified as nontypable.

PFGE for Staphylococcus aureus is being used for outbreak and epidemiologic investigation, but not for routine surveillance. Phage typing is no longer available.

You may direct any questions by telephone: (906) 482-3011; or FAX: (906) 482-7550.

GUIDE TO LABORATORY SERVICES - PLACE YOUR ORDER NOW

This guide provides a detailed description of the diagnostic procedures performed by the Bureau of Laboratories at the Michigan Department of Community Health

Available January 1, 1997 Cost: $25.00*

*One complimentary copy will be issued to each Local Health Department

Please contact:
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